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ceased. Mr. Radut has previously refused to join in this application by refusing to sign the Declaration and Power of Attorney documents.

3. Prior to filing the Declaration Under 37 C.F.R. § 1.131, a copy thereof was provided to each of the named inventors for their review and signature, including Mr. Radut.

4. Prior to January 26, 2004, messages were left with Mr. Radut's telephone answering service on several occasions by Mr. Luis Estable of Assignee RIM, seeking Mr. Radut's cooperation with the Declaration Under 37 C.F.R. § 1.131. Mr. Radut has not returned any of Mr. Estable's telephone calls.

5. On January 26, 2004, I forwarded a copy of the Declaration Under 37 C.F.R. § 1.131 to Mr. Radut, again asking that he review, sign and return the papers, by February 2, 2004. I also called Mr. Radut on his home phone number to inquire as to whether he would be signing and returning the papers, but he has refused to return my phone calls or to return the papers. A copy of my letter to Mr. Radut (without enclosures) is attached as Appendix A.

6. The last known address of Mr. Radut is 300 Regina Street, North, Building 1, Apt. 1207, Waterloo, Ontario N2J 3B8.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and the such willful false testimony may jeopardize the validity of the application or any patent issuing thereon.

  
Joseph M. Sauer

2/9/04

*file*



# JONES DAY

NORTH POINT • 901 LAKESIDE AVENUE

CLEVELAND, OHIO 44114-1190

TELEPHONE: 216-586-3939 • FACSIMILE: 216-579-0212

WRITER'S DIRECT NUMBER:

Direct Number: (216) 586-7506  
jmsauer@jonesday.com

JP002086/rhb:1159910

~~555255012-322~~

January 26, 2004

## VIA FEDERAL EXPRESS

Mr. Dan Radut  
300 Regina St. N  
Waterloo, ON  
N2J 3B8  
CANADA

Re: U.S. Patent Application "System and Method for Powering and Charging a Mobile Communication Device"

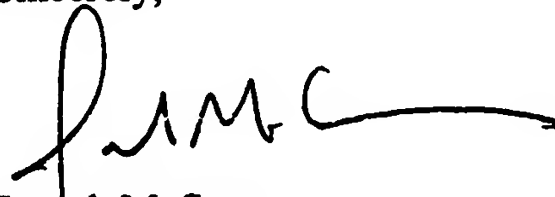
Dear Mr. Radut:

I am patent counsel to Research In Motion Limited and am writing to request your cooperation in matters related to the above-referenced U.S. Patent Application, for which you are a named inventor. In particular, the enclosed "Declaration Under 37 C.F.R. § 131" has been prepared in order to establish a date of invention before a patent cited in an Office Action by the U.S. Patent and Trademark Office. I have also enclosed a copy of the patent application for your convenience.

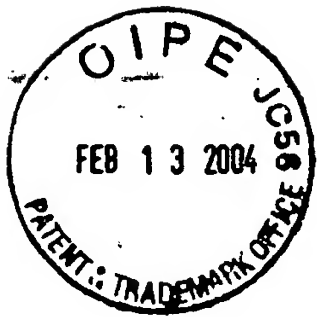
Please review the enclosed copy of the Declaration. Once you have completed your review, please sign and date the Declaration and return the signature page (page 7) to me by facsimile (1-216-579-0212) or by express mail at the address listed above. **If we do not receive your signed Declaration before February 4, 2004, then we will assume that you are unwilling to cooperate in this matter and have refused to sign.**

Please note that the enclosed Declaration and patent application are confidential to Research In Motion Limited. Telephone me directly if you have any questions regarding this matter.

Sincerely,

  
Joseph M. Sauer

Enclosures



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Attorney Docket No. 555255012322

Group Art Unit: 2838 )  
Examiner: Bao Q. Vu )  
Inventor: FISCHER, et al. )  
Serial No.: 10/087,391 )  
Filed: 03/01/2002 )  
For: System And Method For Powering )  
And Charging A Mobile )  
Communication Device )

DECLARATION UNDER  
37 C.F.R. § 1.131

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Declaration is submitted to establish invention of the subject matter of claims 1-25 prior to March 17, 2000, the prior art date of U.S. Pat. No. 6,211,649 under 35 U.S.C. 102(e).

I hereby certify that this correspondence is being deposited today with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA, 22313-1450

on February 9, 2004  
By: A. L. Gijon

We, the undersigned, declare:

1. We are the named inventors of the claimed subject matter of claims 1-25 of the instant application.
2. Prior to March 17, 2000 we conceived of the subject matter of claims 1-25 as evidenced by Exhibit A. Exhibit A is a copy of a document created by Daniel M. Fischer, a named inventor of the instant application, which shows conception of a charging subsystem that receives power from a Universal Serial Bus (USB) port and that is configured to charge a rechargeable battery in a mobile communications device using the power received from the USB port, as set forth in independent claims 1, 15 and 21. Exhibit A is a true and correct copy and was created prior to March 17, 2000. The redacted date in Exhibit A is prior to March 17, 2000.
3. We proceeded with due diligence in reducing the subject matter of claim 1-25 to practice from prior to March 17, 2000 to the effective filing date of the application as evidenced by the following:
  - a. Exhibit B is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit B is a true and correct copy and was created prior to March 17, 2000. The redacted date in Exhibit B is prior to March 17, 2000.
  - b. Exhibit C is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the

invention to practice. Exhibit C is a true and correct copy and was created on May 10, 2000.

c. Exhibit D is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit D is a true and correct copy and was created on May 31, 2000.

d. Exhibit E is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit E is a true and correct copy and was created on June 7, 2000.

e. Exhibit F is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to prepare a provisional patent application directed to the subject matter of the instant application. Exhibit F is a true and correct copy and was created on July 24, 2000.

f. Exhibit G is a copy of an e-mail message created by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to prepare a provisional patent application directed to the subject matter of the instant

application. Exhibit G is a true and correct copy and was created on July 31, 2000.

g. Exhibit H is a copy of an e-mail message created by Jonathan Malton, a named inventor of the instant application, showing ongoing efforts to prepare a provisional patent application directed to the subject matter of the instant application. Exhibit H is a true and correct copy and was created on July 31, 2000.

h. Exhibit I is a copy of an e-mail message created by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit I is a true and correct copy and was created on August 22, 2000.

i. Exhibit J is a copy of an e-mail message received by Daniel Fischer and Jonathan Malton, named inventors of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit J is a true and correct copy and was created on August 31, 2000.

j. Exhibit K is a copy of an e-mail message created by Jonathan Malton, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit K is a true and correct copy and was created on August 31, 2000.

k. Exhibit L is a copy of an e-mail message received by Daniel Fischer, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit L is a true and correct copy and was created on September 14, 2000.

l. Exhibit M is a copy of an e-mail message created by Jonathan Malton, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit M is a true and correct copy and was created on November 9, 2000.

m. Exhibit N is a copy of an e-mail message received by Jonathan Malton and Daniel Fischer, named inventors of the instant application, showing ongoing efforts to prepare a provisional patent application directed to the subject matter of the instant application. Exhibit N refers to a meeting that took place on January 18, 2001 at which Jonathan Malton and Daniel Fischer received a draft of the provisional patent application. Exhibit N is a true and correct copy and was created on February 2, 2001.

n. Exhibit O is a copy of an e-mail message created by Dan Radut, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit O is a true and correct copy and was created on February 8, 2001.



o. Exhibit P is a copy of an e-mail message created by Dan Radut, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit P is a true and correct copy and was created on February 9, 2001.

p. Exhibit Q is a copy of an e-mail message created by Dan Radut, a named inventor of the instant application, showing ongoing efforts to reduce the invention to practice. Exhibit Q is a true and correct copy and was created on February 12, 2001.

q. Exhibit R is a copy of an e-mail message received by Daniel Fischer, Dan Radut, Mike Habicher, Quang Luong, and Jonathan Malton, named inventors of the instant application, showing ongoing efforts to prepare a provisional patent application directed to the subject matter of the instant application. Exhibit R is a true and correct copy and was created on February 26, 2001.

r. A completed draft of the provisional patent application directed to the subject matter of the instant application was provided to outside counsel for the assignee of the instant application, Research In Motion, Inc. ("RIM"), on February 27, 2001, as shown by copy of the e-mail in Exhibit S. RIM's counsel then prepared and filed provisional patent application Ser. No. 60/273,021 on March 1, 2001.

s. The instant application was then prepared and filed on March 1, 2002, and claimed the benefit of the provisional patent application Ser. No. 60/273,021.

4. We hereby declare that all statements made herein are of our own knowledge and are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued.

  
Daniel M. Fischer

Date: January 30, 2004

\_\_\_\_\_  
Dan D. Radut

Date: \_\_\_\_\_

\_\_\_\_\_  
Michael F. Habicher

Date: \_\_\_\_\_

\_\_\_\_\_  
Quang A. Luong

Date: \_\_\_\_\_

\_\_\_\_\_  
Jonathan T. Malton

Date: \_\_\_\_\_

\_\_\_\_\_  
Charles B. Meyer

Date: \_\_\_\_\_

s. The instant application was then prepared and filed on March 1, 2002, and claimed the benefit of the provisional patent application Ser. No. 60/273,021.

4. We hereby declare that all statements made herein are of our own knowledge and are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued.

\_\_\_\_\_  
Daniel M. Fischer

Date: \_\_\_\_\_

\_\_\_\_\_  
Dan D. Radt

Date: \_\_\_\_\_

  
\_\_\_\_\_  
Michael F. Habicher

Date: JAN 30<sup>TH</sup>, 2004

\_\_\_\_\_  
Quang A. Luong

Date: \_\_\_\_\_

\_\_\_\_\_  
Jonathan T. Malton

Date: \_\_\_\_\_

\_\_\_\_\_  
Charles B. Meyer

Date: \_\_\_\_\_

\_\_\_\_\_  
TO: JOSEPH SAUER  
JONES DAY  
216-579-0212  
\_\_\_\_\_

s. The instant application was then prepared and filed on March 1, 2002, and claimed the benefit of the provisional patent application Ser. No. 60/273,021.

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\_\_\_\_\_  
Daniel M. Fischer

Date: \_\_\_\_\_

\_\_\_\_\_  
Dan D. Radut

Date: \_\_\_\_\_

\_\_\_\_\_  
Michael F. Habischer

Date: \_\_\_\_\_

  
\_\_\_\_\_  
Quang A. Luong

Date: January 28, 2004

\_\_\_\_\_  
Jonathan T. Malton

Date: \_\_\_\_\_

\_\_\_\_\_  
Charles B. Meyer

Date: \_\_\_\_\_

s. The instant application was then prepared and filed on March 1, 2002, and claimed the benefit of the provisional patent application Ser. No. 60/273,021.

4. We hereby declare that all statements made herein are of our own knowledge and are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued.

\_\_\_\_\_  
Daniel M. Fischer

Date: \_\_\_\_\_

\_\_\_\_\_  
Dan D. Radut

Date: \_\_\_\_\_

\_\_\_\_\_  
Michael F. Habicher

Date: \_\_\_\_\_

\_\_\_\_\_  
Quang A. Luong

Date: \_\_\_\_\_

  
Jonathan T. Malton

Date: Feb 3/04

\_\_\_\_\_  
Charles B. Meyer

Date: \_\_\_\_\_

s. The instant application was then prepared and filed on March 1, 2002, and claimed the benefit of the provisional patent application Ser. No. 60/273,021.

4. We hereby declare that all statements made herein are of our own knowledge and are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued.

\_\_\_\_\_  
Daniel M. Fischer

Date: \_\_\_\_\_

\_\_\_\_\_  
Dan D. Radut

Date: \_\_\_\_\_

\_\_\_\_\_  
Michael F. Habicher

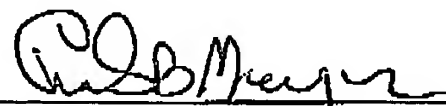
Date: \_\_\_\_\_

\_\_\_\_\_  
Quang A. Luong

Date: \_\_\_\_\_

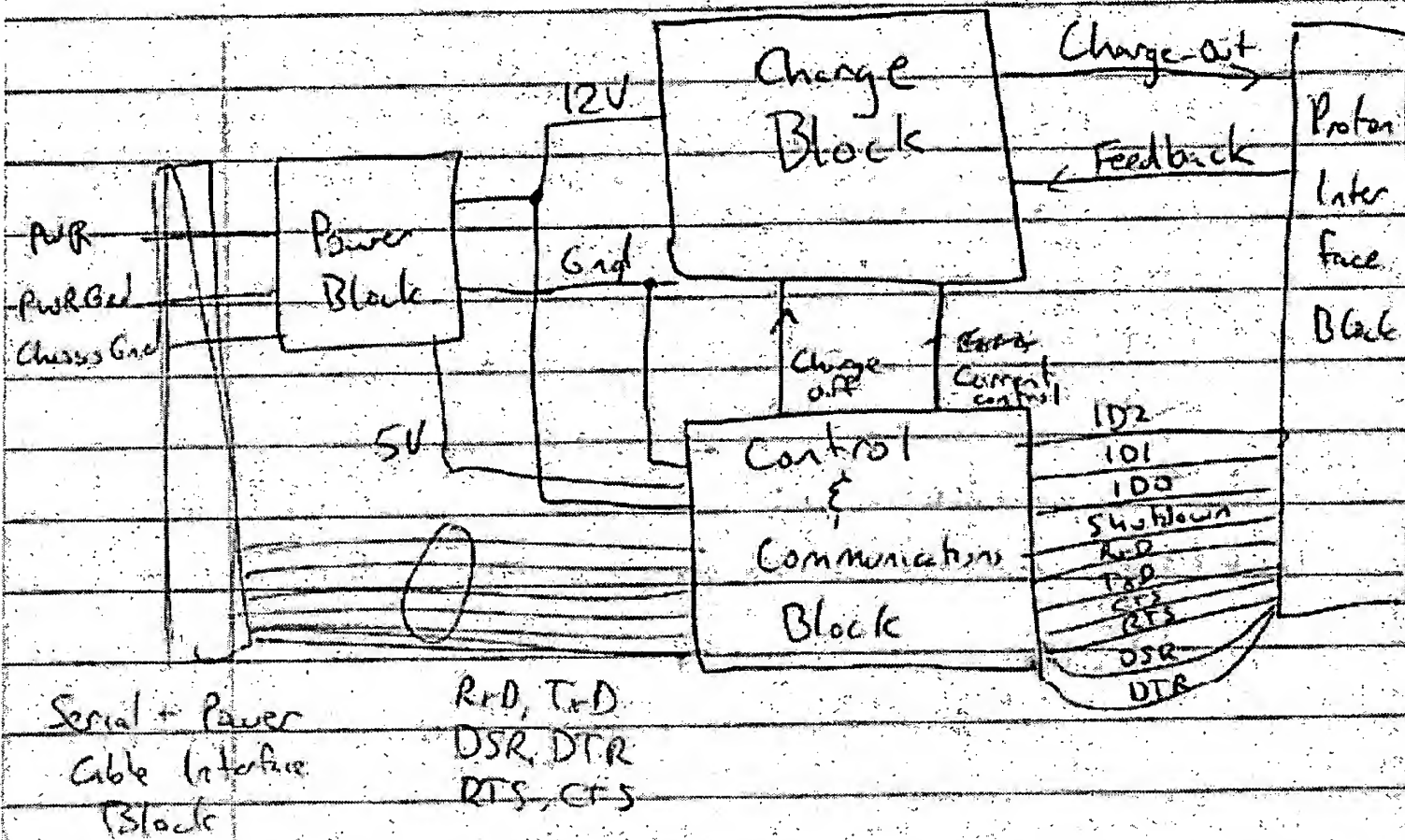
\_\_\_\_\_  
Jonathan T. Malton

Date: \_\_\_\_\_

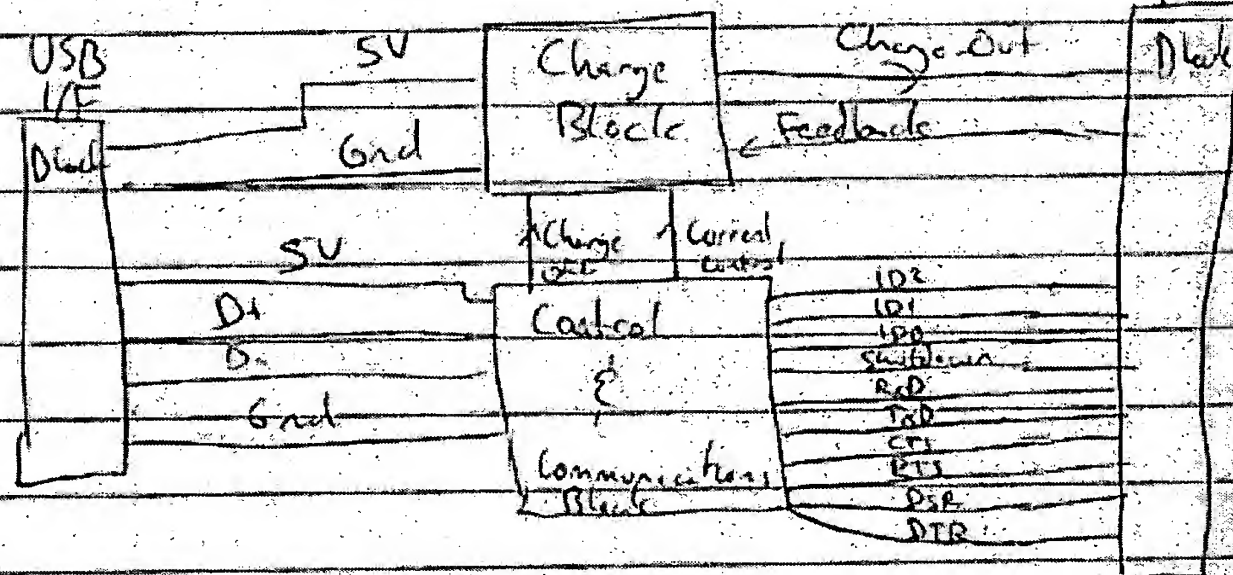
  
\_\_\_\_\_  
Charles B. Meyer

Date: 2 February 2004

# Proton Cradle - Serial Version



## Proton Cradle - USB Version



From: Nikolai Petrov  
Sent: Daniel Fischer  
To: Daniel Fischer  
Subject: USB power specification

REDACTED

Daniel, I think you can find some info on how to specify power consumption in CONFIGURATION DESCRIPTOR. Attached is an example of the descriptor I had to use on my last work term. The stuff in bold specifies power. I am not 100% sure but you may be able to specify several interfaces for your USB device with different power modes...

With new Win98 driver requirements, every device and driver should report power relatively accurately, and be able to shut down the driver and/or the device. I wasn't too sure about all this stuff since it was the least of my concern though... The driver's newsgroup is a really good resource. There is a very knowledgeable guy there who wrote a book on drivers. His name is Walter Oney. He always replies to questions. His driver book is also sold in the stores. I didn't have his book, but he seems like he knows this stuff very nicely. Sometimes there are also pointers to other newsgroups that discuss 'chip' ideas too. Like for example if you want to choose which USB controller to use - you can ask in the driver newsgroup, but most likely they'd direct you to another one...

The warning \*\*\*\*\* do not make a multiple of 8 \*\*\*\*\* is only there for National's USBN9602 because of their stupid bug that they didn't catch...

```
static unsigned char config_descriptor[] =
{
    9,                // bLength
    CONFIGURATION,    // bDescriptorType
    39, 0,            // wTotalLength ***** do not make a multiple of 8 *****
    1,                // bNumInterfaces
    1,                // bConfigurationValue
    0,                // iConfiguration
    0x40,             // bmAttributes - 0x40 = self powered
    10,               // MaxPower - 20mA

    // interface 0
    9,                // bLength
    INTERFACE,        // bDescriptorType
    0,                // bInterfaceNumber
    0,                // bAlternateSetting
    1,                // bNumEndpoints
    0x00,             // bInterfaceClass
    0x00,             // bInterfaceSubClass
    0x00,             // bInterfaceProtocol
    0,                // iInterface

    // 3 endpoints that we use.

    // Pipe 0 (Bulk RX EP#2) for writing from Windows to ColdFire
    7,                // length of this desc. Physical EP2 & EP4
    // (address 2) - 2x32 byte Bulk Ping-Pong RX
    ENDPOINT,         // ENDPOINT descriptor
    0x02,             // EP#2 (OUT from HOST)
    2,                // attributes (BULK)
    0x20,0x00,        // max packet size (32)
    0xFF,             // interval (ms)

    // Pipe 1 (Bulk TX EP#3) for reading in Windows from ColdFire
    7,                // length of this desc. Physical EP3 (address 3) - 32 byte Bulk TX
    ENDPOINT,         // ENDPOINT descriptor
    0x83,             // EP#3 (IN to HOST)
    2,                // attributes (BULK)
```



```

0x20,0x00,    // max packet size (32)
0xff,        // interval (ms)

// Pipe 2 (Interrupt TX EP#5) for Interrupt reading in Windows
7,           // length of this desc.    Physical EP5 (address 5) - 64 byte Intr TX
ENDPOINT,    // ENDPOINT descriptor
0x85,        // EP#5 (IN to HOST)
3,           // attributes (INTERRUPT)
0x40,0x00,    // max packet size (64)
0x01,        // interval (1 ms) poll very often
};

```

---

Nikolai Petrov, Research In Motion, [npetrov@rim.net](mailto:npetrov@rim.net)

**From:** Jim DeCarolis/Toronto/Tech-Trek Ltd%TECH-TREK LTD@tech-trek.com  
**Sent:** May 10, 2000 3:22 PM  
**To:** Daniel Fischer  
**Cc:** Mark Lyddon  
**Subject:** Linear Tech LT1512CS8



Microsoft Word 4

Hello Daniel, how are you?

I brought a package over to you on Monday with all the Linear Tech. Hot Swap information. Hope you got it ok.

During our meeting with Rynk, you asked us to quote on 100K pieces of the LT1512CS8.

Attached is our quotation. As you will see, we now show the 50K pricing which was quoted previously and the 100K price. We were able to get RIM \$0.21 lower for the higher volume.

We appreciate your interest in Linear Tech and the consideration you are giving us on your new design. If you need any more samples or even another demo board, please do not hesitate to give us a call.

Many thanks,  
Jim De Carolis.

Please see the attached quotation.  
(See attached file: quote.doc)

<b>From:</b>	<b>Chris Dietrich</b>
<b>Sent:</b>	May 31, 2000 10:42 AM
<b>To:</b>	Daniel Fischer
<b>Subject:</b>	Current Draw by LT1512

Hi Dan,

I was wrong about my guess of the required current draw for the lt1512. The current going through the sense resistor is the same current that flows through the load, so the total current draw for the device should be around ~406 mA during a 400 mA charging cycle. Not 800 mA!

This part I'm using could be screwed, I'll have to grab another sample from you and try the board again.

Chris

From: Chris Dietrich  
Sent: June 7, 2000 2:41 PM  
To: Daniel Fischer  
Subject: FW: Samples of SC1408

Sorry to bother you while on Holiday Dan,  
But am I allowed to tell Gord that this is for a USB Charger Circuit? Or is that RIM Confidential?  
Chris

-----Original Message-----

From: Gord Radman [mailto:Gord@neutronics.ca]  
Sent: Wednesday, June 07, 2000 2:41 PM  
To: Chris Dietrich  
Subject: RE: Samples of SC1408

Hi Chris,

10 samples have already been ordered. An order for an evaluation board was submitted, however it will take another day or so to determine if that can actually be done. If Semtech has already spun an eval board for the part then it doesn't take much to get one to you. If it has never been done before it may take a few weeks, if at all possible. I will let you know. Dave Moyer, a Semtech Field Applications Engineer, is available to help you with anything that is not evident in the data sheets. His number is 610-792-9395.

The only question I have at this time is does there exist any formal or logical "project name" which I can associate with this request?

-----Original Message-----

From: Chris Dietrich [mailto:cdietrich@rim.net]  
Sent: June 6, 2000 11:56 AM  
To: Gord Radman (E-mail)  
Cc: Daniel Fischer  
Subject: Samples of SC1408

Hi Gord,

I'm a hardware design engineer at Research In Motion working with Daniel Fischer on some LI-ion charging circuitry. I've been looking at the SemTech website at their DC-DC Converters and I'm interested in the SC1408 SEPIC Controller. I was wondering if it would be possible to get samples or perhaps an evaluation board of the SC1408 with its recommended parts.

If it is possible to get an evaluation board, I would like it to hook up the controller in the SEPIC configuration with a current limit of 400 mA with an output voltage of 5 Volts.

Anyway, let me know and have a good day.

Chris Dietrich  
Hardware Designer  
Research In Motion  
(519)888-7465 x2719

<b>From:</b>	<b>David Walters</b>
<b>Sent:</b>	July 24, 2000 10:21 AM
<b>To:</b>	Daniel Fischer
<b>Cc:</b>	Luis Estable
<b>Subject:</b>	USB Charger patent application

Hi Dan,

FYI, the preparation of the above patent application has now been re-assigned to Luis Estable, who is located in the Kanata office. Any inquiries, questions, comments and such regarding this application should now be directed to him.

Dave

David Walters  
Patent Engineer Trainee  
Research in Motion Limited (RIM)  
295 Phillip Street  
Waterloo, ON  
CANADA N2L 3W8

Tel.: (519) 888-7465, X-2859  
Fax: (519) 888-1975  
email: [dwalters@rim.net](mailto:dwalters@rim.net)

From: Daniel Fischer  
Sent: July 31, 2000 4:42 PM  
To: Luis Estable  
Subject: RE: Patent Application -- USB charger

Tomorrow sounds fine. My car is getting a tune up and the dealer is coming to pick me up. Thanks for the offer though...

Dan

Daniel Fischer, Hardware Designer  
Research In Motion  
DFischer@rim.net  
519.888.7465 X2414

-----Original Message-----

From: Luis Estable  
Sent: Monday, July 31, 2000 4:41 PM  
To: Daniel Fischer  
Subject: RE: Patent Application -- USB charger

Great!

How about 5:00 PM tomorrow then, at your office?

Is your car getting repaired? I have a rental and would not mind in the least giving you a lift.

With regards,

Luis Pablo Estable, E.I.T.  
RIM Confidential

Patent Engineer Trainee  
Research In Motion Limited  
600 Terry Fox Drive  
Suite #100  
Kanata, Ontario  
CANADA K2L 4B6

tel.: 613.599.7465 x4301  
fax: 613.599.5109  
e-mail: lpe@rim.net

-----Original Message-----

From: Daniel Fischer  
Sent: July 31, 2000 4:31 PM  
To: Luis Estable  
Subject: RE: Patent Application -- USB charger

Sounds fine to me...

I am awaiting my pickup so I can get my car back....

Dan

Daniel Fischer, Hardware Designer  
Research In Motion  
DFischer@rim.net  
519.888.7465 X2414

-----Original Message-----

From: Luis Estable  
Sent: Monday, July 31, 2000 4:25 PM  
To: Daniel Fischer  
Subject: Patent Application -- USB charger

Hi Dan,

I just passed by your office and it appears that I just missed you.

Could we meet tomorrow, wednesday or thursday, late afternoon, preferably around 5:00?

I have gsm/gprs training all week.

Thanks!

With regards,

Luis Pablo Estable, E.I.T.  
RIM Confidential

Patent Engineer Trainee  
Research In Motion Limited  
600 Terry Fox Drive  
Suite #100  
Kanata, Ontario  
CANADA K2L 4B6

tel.: 613.599.7465 x4301  
fax: 613.599.5109  
e-mail: lpe@rim.net

**From:** Jonathan Malton  
**Sent:** July 31, 2000 2:23 PM  
**To:** Daniel Fischer  
**Subject:** USB charging patent app

Hi Dan

Krishna is working on a patent application involving charging a device from USB, and needs some flowcharts, and examples of limitations and ways that they have been overcome. Perhaps you and I could get together later this week and discuss this. I'll do the charts and gather the doc's, but need some input from a USB expert like yourself.

j

Jonathan Malton ([jmalton@rim.net](mailto:jmalton@rim.net))  
Director, Power and Interface Engineering  
Research in Motion Limited, Waterloo, Ontario



<b>From:</b>	<b>Daniel Fischer</b>
<b>Sent:</b>	August 22, 2000 3:14 PM
<b>To:</b>	'dcochran@pttinc.on.ca'; 'jkergr@mtron.com'
<b>Subject:</b>	USB Crystal Oscillator specs...

Hi Dave and John,

As per our earlier conversation today, the requirements for the USB crystal are as follows:

12Mhz +/- 0.25% over capacitive loading, temperature, and aging  
maximum capacitance on microprocessor crystal pins: 9pF

Please let me know if you require anything else.

Thanks,

Dan

**Daniel Fischer**, Hardware Designer

Research In Motion  
DFischer@rim.net  
519.888.7465 X2414

<b>From:</b> Jason Griffin
<b>Sent:</b> August 31, 2000 3:31 PM
<b>To:</b> Daniel Fischer; Jonathan Malton; Jack Idzik; Rob Phillips
<b>Subject:</b> RE: USB connector for Tachyon2

I was talking to Joe Tullo, and he said that the 5th pin in the mini USB spec that is unused is so that you can have communications without a host, basically mini-USB to mini-USB, maybe exactly what we need. Would the use of one extra pin be enough to allow us to communicate with accessories.

Jason

-----Original Message-----

**From:** Daniel Fischer  
**Sent:** Wednesday, August 30, 2000 10:43 AM  
**To:** Jason Griffin; Jonathan Malton; Jack Idzik; Rob Phillips  
**Subject:** RE: USB connector for Tachyon2

Based on the hardware drivers for an USB-function, I don't believe that is possible. The USB SIE is a hardware engine that we write registers to. The silicon is designed to follow the USB standard, specifically as a USB function in our case. Unlike RS232 where the implementation is mostly in software, USB implements most of the transmission via hardware.

For us to communicate via USB in the generic sense, we have to do the following:

- setup registers to identify device, power required from bus, and type of information we want to transfer.
- Transfer packets from CPU core to USB SIE or read packets from USB SIE into CPU core.

THERE IS NO WAY WE CAN FAKE OUT OUR USB SIE (assuming we are a USB function) TO COMMUNICATE AS A HOST.

Okay, I will stop yelling that point. ☺ Also, to multiplex hardware onto the USB lines may be more cumbersome than just taking the RS232 lines directly off of the CPU via the UART which it was designed for.

Also, if we go the route of handspring, we would only need a ten pin port connector to have both USB and RS232 (pin out in no particular order):

Pin1: VBus  
Pin2: D+  
Pin3: D-  
Pin4: Gnd  
Pin5: TxD  
Pin6: RxD  
Pin7: DTR

Pin8: DSR  
Pin9: RTS  
Pin10: CTS

Although we could probably get away with a six pin connector (pins1 through 6) if we had to...

Rob: To answer your question, we would probably need three to seven pins if we were use an expansion port under the battery compartment.

Dan

**Daniel Fischer**, Hardware Designer

Research In Motion  
[DFischer@rim.net](mailto:DFischer@rim.net)  
519.888.7465 X2414

-----Original Message-----

**From:** Jason Griffin  
**Sent:** Wednesday, August 30, 2000 10:23 AM  
**To:** Jonathan Malton; Daniel Fischer  
**Cc:** Jack Idzik; Rob Phillips  
**Subject:** RE: USB connector for Tachyon2

It would not have to follow the USB standard, because it would be a peripheral designed specifically for our device. We could possibly use some other system like a detect switch to have it switch into some other type of communication mode.

Jason

-----Original Message-----

**From:** Jonathan Malton  
**Sent:** Wednesday, August 30, 2000 10:08 AM  
**To:** Jason Griffin; Daniel Fischer  
**Cc:** Jack Idzik; Rob Phillips  
**Subject:** RE: USB connector for Tachyon2

Interesting question. There is not any way currently planned for the handheld's USB port to be master in any relationship, nor to provide power to a peripheral. The only way right now for communication with a peripheral would be for the peripheral to be the USB master, and to be powered.

Yes, this is a limitation to which I hadn't given any thought before now.

-----Original Message-----

**From:** Jason Griffin  
**Sent:** Wednesday, August 30, 2000 9:53 AM  
**To:** Jonathan Malton; Daniel Fischer  
**Cc:** Jack Idzik; Rob Phillips  
**Subject:** USB connector for Tachyon2

Is it possible to communicate easily to (possibly non-powered accessories) accessories such as barcode scanners, GPS, SmartCard readers, through a USB port, or would we have to have a serial port.

Jason

**From:** Jonathan Malton  
**Sent:** August 31, 2000 10:34 AM  
**To:** Quang Luong; Mark Church; Jack Idzik; Daniel Fischer; Omar Barake  
**Cc:** Steve Carkner  
**Subject:** RE: USB insomnia

Fortunately, it seems that the insomnia is mostly a problem for internal USB peripherals, which our handheld products are not. I don't think it's much of a drawback for a USB-connected handheld not to have the ability to awaken the attached host, since that capability doesn't seem necessary to perform the function of the link between the handheld and the host.

I'm glad that you pointed it out to us though. It's a problem of which I was totally unaware, and it might affect us sometime.

~wjm

-----Original Message-----

**From:** Quang Luong  
**Sent:** Wednesday, August 30, 2000 5:36 PM  
**To:** Mark Church; Jonathan Malton; Jack Idzik; Daniel Fischer; Omar Barake  
**Cc:** Quang Luong; Steve Carkner  
**Subject:** USB insomnia

Steve forward me an article on USB and sleep mode. Please review it carefully and considered the issue when implementing USB in our future product.

Regards,  
Q

<b>From:</b>	<b>Jack Nowinski</b>
<b>Sent:</b>	September 14, 2000 10:40 AM
<b>To:</b>	Daniel Fischer
<b>Subject:</b>	USB power.

Dan,

Here's my summary on USB power that you wanted me to e-mail you, tell me what you think of my bottom example to illustrate a technical point ☺

Upon physically plugging the device (peripheral) into the host hardware (before the host OS even knows something was connected) automatically supplies 100mA at 5V to the peripheral. *This is the basic requirement of a hub as specified by the USB spec.* Laptops generally only give you 100mA per USB port and that's it, this also applies to bus powered hubs such as USB keyboard hubs that run on bus power and have only four ports. A bus powered hub eats up 100mA (even if it needs it or not) leaving 400mA to feed four additional USB ports at 100mA each (as stated above 100mA at 5V this is the basic power a device is guaranteed upon hook up).

*Basically, In order for a USB device to operate under bus power it must be able to operate (at least initially) in a low power mode that consumes no more than 100mA. This guarantees that regardless of hub type the host OS will know that a device is connected to the hub.*

A hub can give you a maximum of either 100mA or 500mA, *there's no such thing as a hub that can give you something like 250mA max. it must be either 100mA or 500mA.* Bus powered hubs will only give 100mA, and self powered hubs (like the one on the back of your computer) can and must be able to give you a maximum of 500mA per USB port if the device requests it during enumeration.

However, If the peripheral instantly (i.e. just by being plugged in) wants to drain a current greater than 100mA from the host hub then it will never become enumerated (and will be just like a sitting duck in the pond not able to swim). If the device requires 100mA or less instantly then the software components of the host hub and peripheral begin the next step of enumeration.

Example: A USB device which under normal operation needs 300mA.

- Initially it needs to have a low power mode which consumes 100mA or less.
- During enumeration it will request 350mA from the host (two outcomes can occur)
  - Outcome 1: The host will respond saying that more than 100mA (indicates a bus powered hub) is available. The device must operate in the present low power mode after enumeration is completed.
  - Outcome 2: The host will provide the additional power needed and the device will function in it's "normal mode of operation" after enumeration is completed.

The following example uses a real world example (not at all related to electronics) that illustrates an interesting point about USB power.

In the following example 5 and 3 respectively refer to 500 and 300 milliamps. **Hungry** refers to power need of a device under normal mode operation.

An interesting point to make about the above example is that even though the device needed 300mA and under Outcome 2 it received the required current means the following thing in terms of an analogy: For example you're at the St. Jacobs Farmer's Market (open on Tuesday's, Thursday's and Saturday's), one of the Amish farmers has a basket of 5 Red Delicious apples (grown locally of course) and you only want 3 of those apples, but the 5 apples are there for the taking and for the same price as the 3 that you want. If you are really hungry I would suggest taking all 5 apples, on the other hand if you're equally satisfied with just buying 3 you can do that too.

Hope this helps.

- Jack

**From:** Jonathan Malton  
**Sent:** November 9, 2000 1:34 PM  
**To:** Daniel Fischer; Jack Idzik  
**Subject:** Re: Temperature range for USB Cables... for TachyonII

So I guess we'll have to say that the GSM range is acceptable for usage, but only the USB range is acceptable for charging and communications. It will never be an issue, since the host end of the USB cable is in the same environment as the cable and the handset, and if the temperature is OK for the host, it will be OK for the cable too.

We might have a problem with the USB travel adapter, as Mike wants it to use a normal USB cable. It never needs to be a problem for the user, as hardly anyone will want to charge their handset in a deep freeze, but specifying the temperature in the specifications might appear awkward.

J

---

Jonathan Malton ([jmalton@rim.net](mailto:jmalton@rim.net))  
Director, Power and Interface Engineering  
Research In Motion Limited, Waterloo, Ontario

(sent from my BlackBerry™ Handheld)  
-----Original Message-----

**From:** Daniel Fischer <[DFischer@rim.net](mailto:DFischer@rim.net)>  
**To:** Jonathan Malton <[JMalton@rim.net](mailto:JMalton@rim.net)>  
**Sent:** Thu Nov 09 12:03:46 2000  
**Subject:** Temperature range for USB Cables... for TachyonII

Hi Jonathan,

I just wanted to pass this information your way as I know that the GSM standard has different values than this. Looking at the USB specifications this morning, I noticed that the cable has the following operating temperature specifications:

Operating: 0degC to 50degC  
Storage: -20degC to 60degC

Whereas the GSM specification lists -10degC to +55degC for operation. It means, given this value, that for charging and communications, we will have to either pull back on our specifications or get a custom cable that meets the GSM requirements.

Dan

Daniel Fischer, Hardware Designer  
Research In Motion  
[DFischer@rim.net](mailto:DFischer@rim.net)  
519.888.7465 X2414

**From:** Luis Estable  
**Sent:** February 2, 2001 11:36 AM  
**To:** Krishna Pathiyal; Jonathan Malton  
**Cc:** Daniel Fischer  
**Subject:** RE: battery charging from USB

I believe that we have the general concept down – I gave both Dan Fischer and Jonathan Malton a copy of my draft at the Thursday, January 18, 2001 9:30 AM-11:00 AM USB Charging Scheme meeting.

I still haven't had their feedback on this draft.

Here is a softcopy of that same version for their and your review:



012-132\_USBCharg  
er.doc

Given the new urgency, I took the liberty of drafting the following figure for a system block diagram which might be general enough to cover the system concept of USB charging for the purpose of our patent, while at the same time leave enough room for Jonathan's group to come up with a charging circuit:



012\_132\_USBCharg  
er.PDF

The block diagram illustrates the concept of controlling a current, which is then used by a charging circuit to charge the battery. The processor controls a series of relays that alter the circuit under processor control to:

- 1) perform a soft-disconnect from the USBus causing an enumeration and the allotment of current from the USBus;
- 2) select a resistor in a current divider circuit thereby ensuring that the allotted amount is actually drawn and made available to the charging circuit.

If this is acceptable, I can write up a detailed description based on this figure and add a flowchart to illustrate the described method for a provisional filing.

We can then supplement the application as filed with continuation in parts for each actual design of the charge circuit and actual methods used.

With regards,

Luis Pablo Estable, E.I.T.

RIM Confidential and/or Solicitor-Client Privileged Work Product

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e-mail: lpe@rim.net

-----Original Message-----

**From:** Krishna Pathiyal  
**Sent:** Friday, February 02, 2001 11:11 AM  
**To:** Jonathan Malton; Luis Estable  
**Subject:** FW: battery charging from USB

Let us file the patent application on our development work asap. Luis, what is the status on the application?

Jonathan, the message is vague and inconclusive of what is being allegedly patented. Please proceed with your design work. Should another entity own patent rights in the future, we will entertain licensing that technology where appropriate.

With regards,

Krishna K. Pathiyal  
RIM Confidential and/or Solicitor-Client Privileged Communication

-----Original Message-----

**From:** Jonathan Malton  
**Sent:** Friday, February 02, 2001 10:01 AM  
**To:** Krishna Pathiyal  
**Subject:** battery charging from USB

Hi Krishna

Please look at this link, particularly the Steve Bauer response on the thread, and advise. We are in the midst of implementing a USB-based battery charging system for *all* future pagers, first with Tachyon II and Quark, and the USB charging scheme is also currently being designed into the Esker ASIC.

<http://www.usb.org/forums/developers/messages/12060.html>

Jonathan Malton ([jmalton@rim.net](mailto:jmalton@rim.net))  
Director, Power and Interface Engineering  
Research in Motion Limited, Waterloo, Ontario

<b>From:</b>	<b>Dan Radut</b>
<b>Sent:</b>	February 8, 2001 6:18 PM
<b>To:</b>	Jonathan Malton; Power (820)
<b>Cc:</b>	Jack Idzik
<b>Subject:</b>	Flylight Notebook USB Light

Hi All,

It seems that is very easy to "steal" power from the USB port of a laptop or desktop PC. I did an experiment today using both a laptop and a PC. The voltage on the Vbus is present immediately after turning ON the power ! *The Vbus' voltage is present even during the powerdown state of the computer!!*

I loaded the port in order to draw about 75mA. I measured 5.06V at the laptop Vbus (loaded) rail and 5.10V at the (desktop) PC Vbus (loaded) rail. *At no instant the computer turned off the voltage!*

So no device should be necessary in order to power a lamp from the USB port except a switch!

Dan RADUT  
[dradut@rim.net](mailto:dradut@rim.net)

<b>From:</b>	<b>Dan Radut</b>
<b>Sent:</b>	February 9, 2001 6:15 PM
<b>To:</b>	Jonathan Malton; Power (820)
<b>Cc:</b>	Jack Idzik; Steve Lill
<b>Subject:</b>	USB-powered Li battery charge

Hi All,

I ran another interesting experiment today concerning the charge of a Li battery using the power available at the USB port and making no use of the D+ and D- data lines.

*It seems that someone can draw even 500mA from the USB port without any problem !!*

I used a linear charger based on the LTC1734 charge controller.

First I charged the battery by attaching the charger to the USB port of a desktop PC. The battery has been charged at 490mA rate with the Vbus voltage value settled to 4.76V ! At the end of the charge, Vbus reached its open value: about 5.16V !

When charging from the USB port of an IBM laptop at the same rate ( 490mA ) the Vbus voltage value settled to about 4.65V. This voltage disappeared when the internal laptop batteries were "completely" discharged. But the voltage was present again immediately after the laptop has been attached to its charger! Two important conclusions concerning the laptop are:

- the laptop is a *self-powered device*, even when it is powered from its batteries
- if not powered from the AC adapter, the laptop (batteries) could not have every time the needed capacity to charge the Li battery

More likely, as it is mentioned in the USB standard, the host ( or the self-powered hub ) implements only an over-current protection ( turns off the voltage on the Vbus line for current values exceeding 700mA-800mA ).

Thus a battery charger limiting its charge current value to 500mA can be powered from a high-power USB port without being necessary to be enumerated by the host. BUT SUCH A DEVICE IS NOT COMPLIANT WITH THE USB STANDARD !!

Any comments are welcome.

Thanks,

Dan RADUT  
[dradut@rim.net](mailto:dradut@rim.net)

**From:** Dan Radut  
**Sent:** February 12, 2001 12:19 PM  
**To:** Jonathan Malton  
**Cc:** Mike Habicher; Carl Schaaff; Quang Luong; Daniel Fischer  
**Subject:** RE: Telcom chargwr

Hi Jonathan,

This part is advertised in the January 18<sup>th</sup>, 2001 edition of the EDN magazine because of its fold-back method to control the charge current. This charger is less appropriate to be used in USB environment!

Three main reasons are not favorable for this:

- a) it is not simple at all to implement the current setting circuit for the two USB situations: 100mA/500mA !
- b) the poor accuracy of the voltage threshold used to set the maximum value of the charge current: using its nominal value to set I<sub>max</sub> charge current value to 500mA we can get about 750mA in the worse case !
- c) the trickle charge current value will be very high ( 230mA to 345mA ) !

There are other features which make this charger not a suitable solution for the other pagers ( Proton, Tachyon I ).

We can look at if desired !

Dan RADUT  
[dradut@rim.net](mailto:dradut@rim.net)

-----Original Message-----

**From:** Jonathan Malton  
**Sent:** Sunday, February 11, 2001 10:21 PM  
**To:** Dan Radut  
**Subject:** Telcom chargwr

Hi Dan

On Monday, could you please have a look at a Telcom TC3827 lithium-ion battery charger (linear, 5V in, charge current monitor output, ext'l FET, MSOP8). A Telcom part is being used now in Proton, because it's cheap and it works! It may be no better than the Linear Tech solution, but please let me know.

wjm

---

Jonathan Malton ([jmalton@rim.net](mailto:jmalton@rim.net))  
Director, Power and Interface Engineering  
Research in Motion Limited, Waterloo, Ontario

(sent from my BlackBerry™ Handheld)

From: Luis Estable  
> Sent: February 26, 2001 4:34 PM  
> To: Daniel Fischer; Dan Radut; Mike Habicher; Quang Luong; Jonathan  
Malton  
> Cc: Aaron Cryderman; Krishna Pathiyal  
> Subject: Patent Application -- USB Charger

>  
> Gentlemen,  
>  
> Please have a look at the following:

>  
>  
> > > <<012-132\_Specification.pdf>> > > <<012-132\_Drawings.PDF>> > >  
<<esker-2001-02-12.pdf>>

>  
> Your Esker spec will be included as an appendix.

>  
> Furthermore, let me know if you are willing to make any corrections or  
additions to the above directly. I can send you a soft-editable copy for that  
purpose.

>  
> I would like to file this application provisionally this week - we will  
have one year after filing to improve/change the description.

>  
> In that regard, Aaron Cryderman has some supporting documentation that you  
all need to sign off on. Please make arrangements with him to sign the  
supporting documentation ASAP.

>  
> Thanks!

>  
> With regards,

>  
> Luis Pablo Estable, E.I.T.  
> Patent Engineer Trainee  
> RIM Confidential and/or Solicitor-Client Privileged Work Product

>  
>



012-132\_Specification.p 012-132\_Drawings.PD esker-2001-02-12.pr



Krishna Pathiyal  
<kpathiyal@rim.net>

02/28/01 01:13 PM

To: "David Cochran Esq. (E-mail)" <David\_Cochran@jonesday.com>,  
"Deborah A. Satoran (E-mail)"  
<deborahasatoran%JONESDAY@JonesDay.com>  
cc: Aaron Cryderman <acryderman@rim.net>  
Subject: FW: 555255012132: "SYSTEM AND METHOD FOR ADAPTING  
A USB TO PROVIDE POWER FOR CHARGING A MOBILE  
DEVICE"

Dave/Deb

Further to Aaron's message with attachment, please proceed to file the above-captioned matter as a provisional patent application before the USPTO. You have the supporting documentation for filing same.

With regards,

Krishna K. Pathiyal  
Intellectual Property Counsel  
Research In Motion Limited

Tel: ++ 519.888.7465 x 2535  
Fax: ++ 519.888.1975  
Email: kpathiyal@rim.net

-----Original Message-----

From: Aaron Cryderman  
Sent: Tuesday, February 27, 2001 4:25 PM  
To: Deborah Satoran (E-mail)  
Cc: Krishna Pathiyal; Luis Estable  
Subject: 555255012132: "SYSTEM AND METHOD FOR ADAPTING A USB TO PROVIDE POWER FOR CHARGING A MOBILE  
DEVICE"

Deb, attached is a password protected WinZip file containing the above-mentioned patent application. Paper copies are being sent today via courier.

If you have any questions, please contact Krishna Pathiyal or myself. Krishna will provide you with filing instructions.

Regards,

Aaron Cryderman  
Legal Assistant



<<012-132\_Specification.zip>> 012-132\_Specification.z